ting the Effects of Elevated Flows on the Spaw
Behavior of Chum Salmon in the Columbia Rive

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Background

From November 1 through December 15, 2003, tailwater elevations exceeded
13 feet on 17 occasions and they exceeded 14 feet on 14 occas
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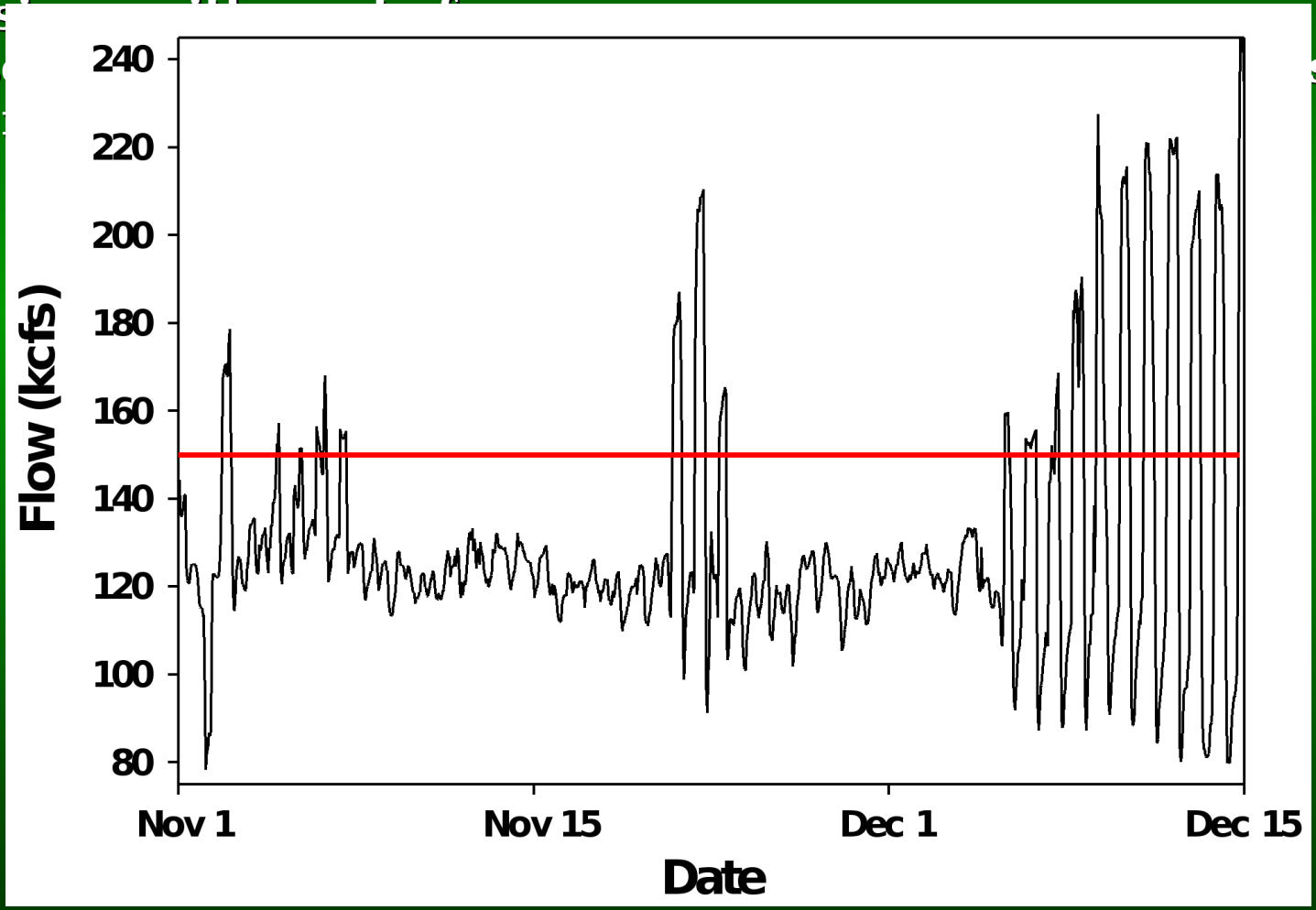
load



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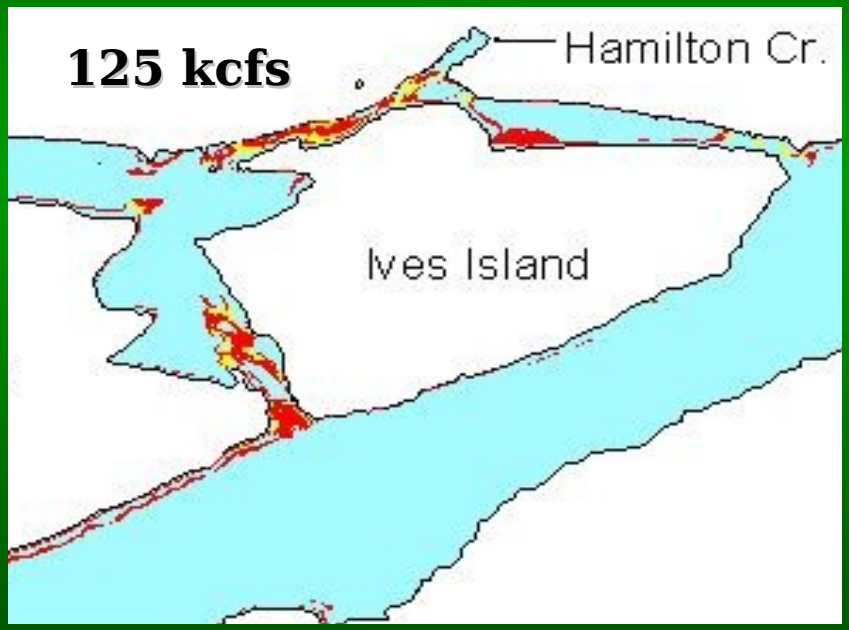
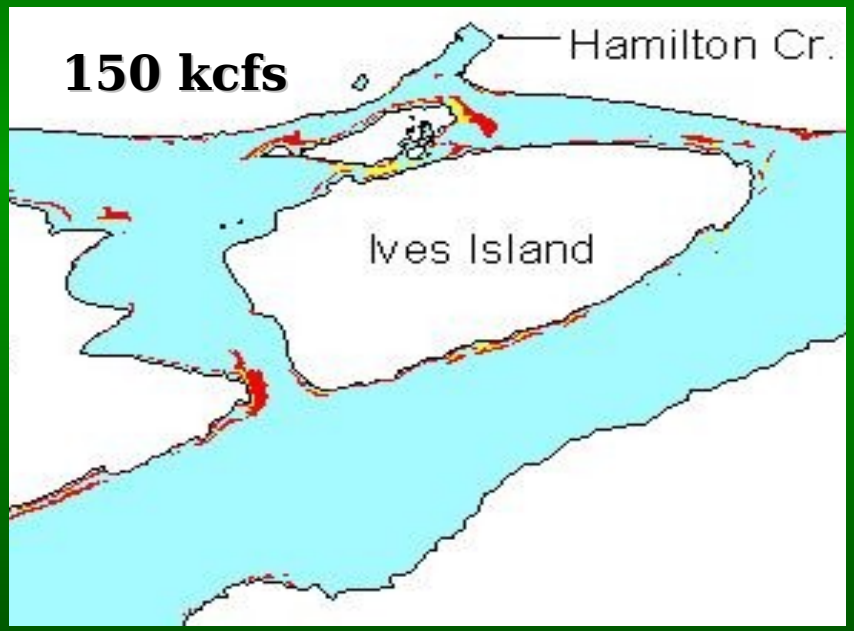
Background

These tailwater elevations corresponded to flows >150 kcfs. Our p habitat work showed a significant reduction in the amount of suital spawning habitat at flows >150 kcfs in the area below the mouth o Creek (Garland et al. 2003) likely due to increased water velocities.





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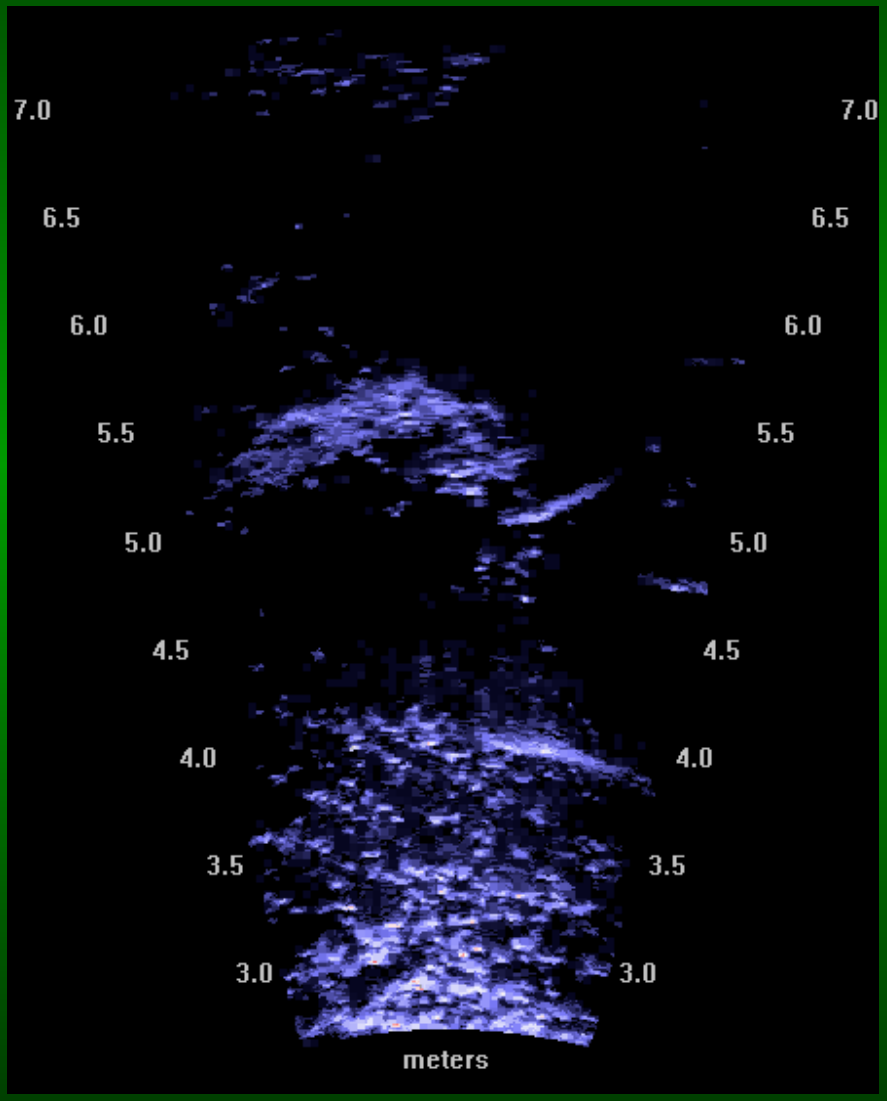
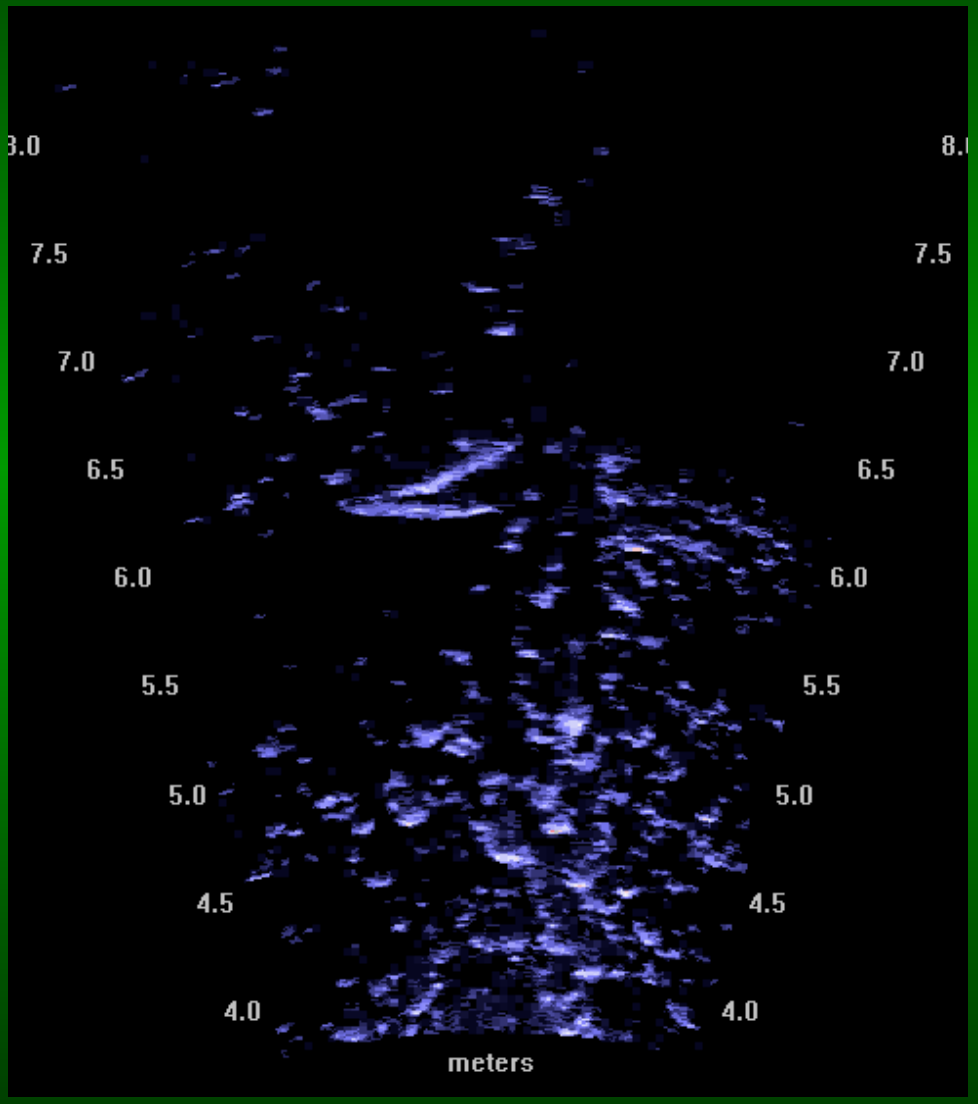
Background

Night spawning of chum salmon was documented in 2003.



Courtship behavior



Spawning event

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Proposed 2004 Work

Do elevated flows affect chum salmon spawning b

Expected responses:

1. **None**
2. **Temporary displacement, but return to spa**
3. **Displacement with spawning elsewhere**
4. **Displacement without spawning elsewhere**

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Objectives

1. Determine the flow and tailwater elevation at which chu
   spawning behavior is altered.

2. Determine where fish go in response to high flows and w
   return to their redds.

3. Determine if normal spawning behavior resumes after a
   change in behavior.

4. Determine if fish will spawn at higher riverbed elevation
   flows inundate these areas.

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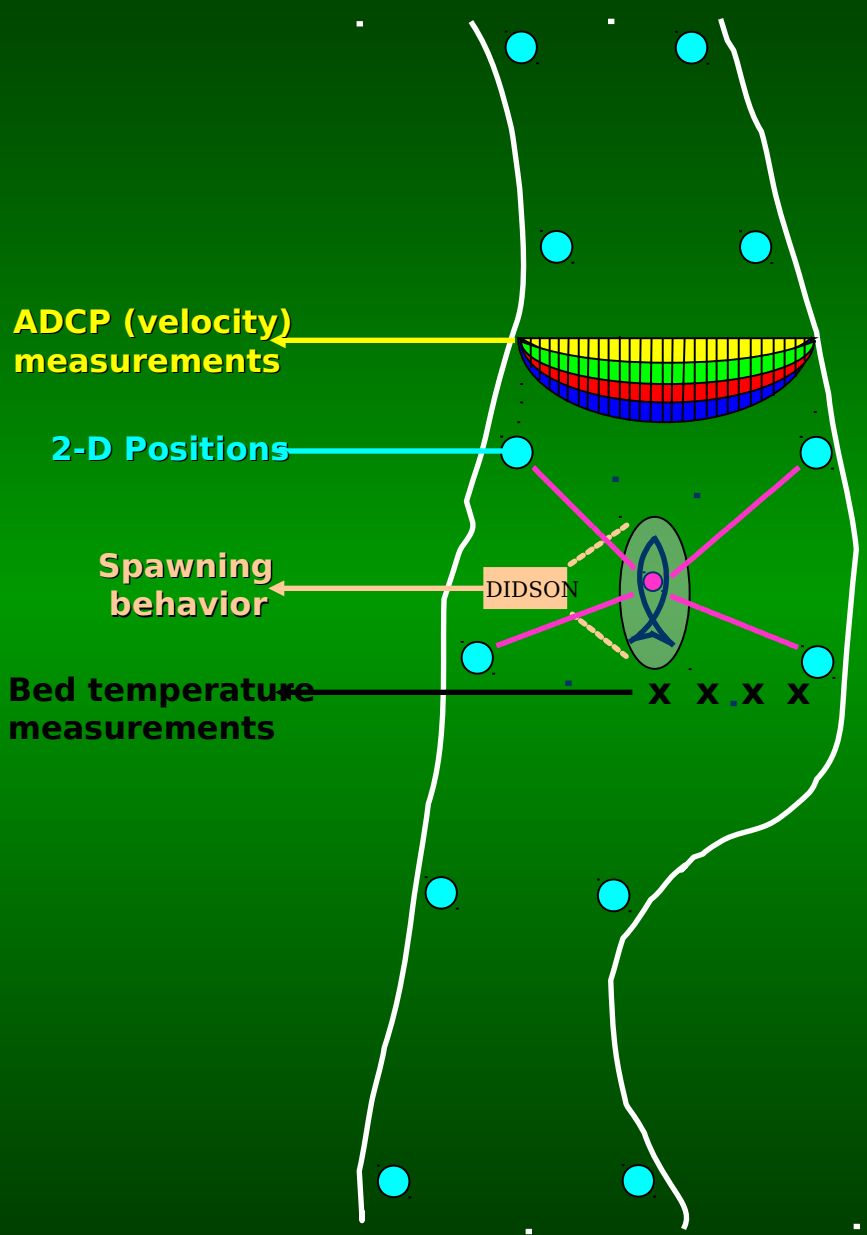
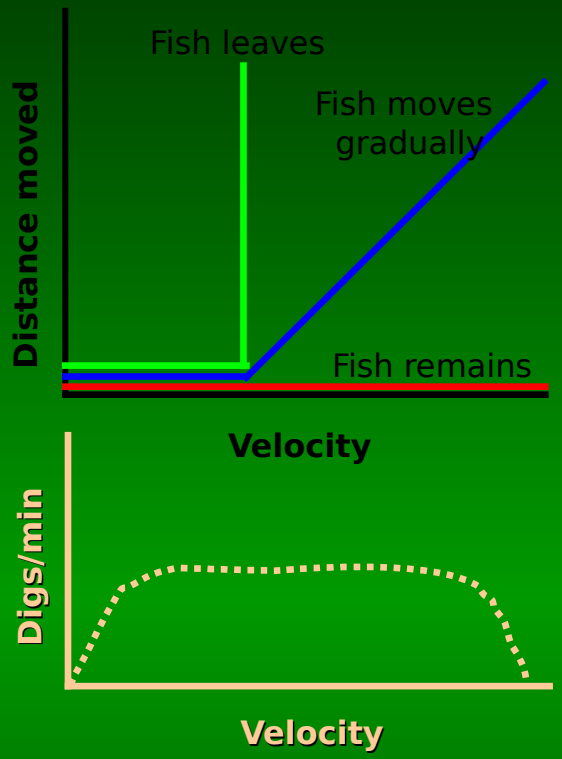
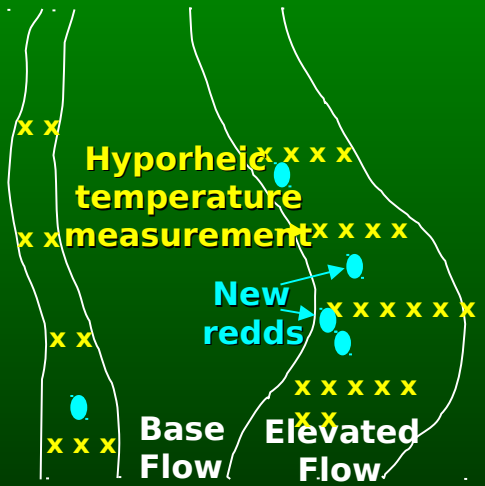
Approach







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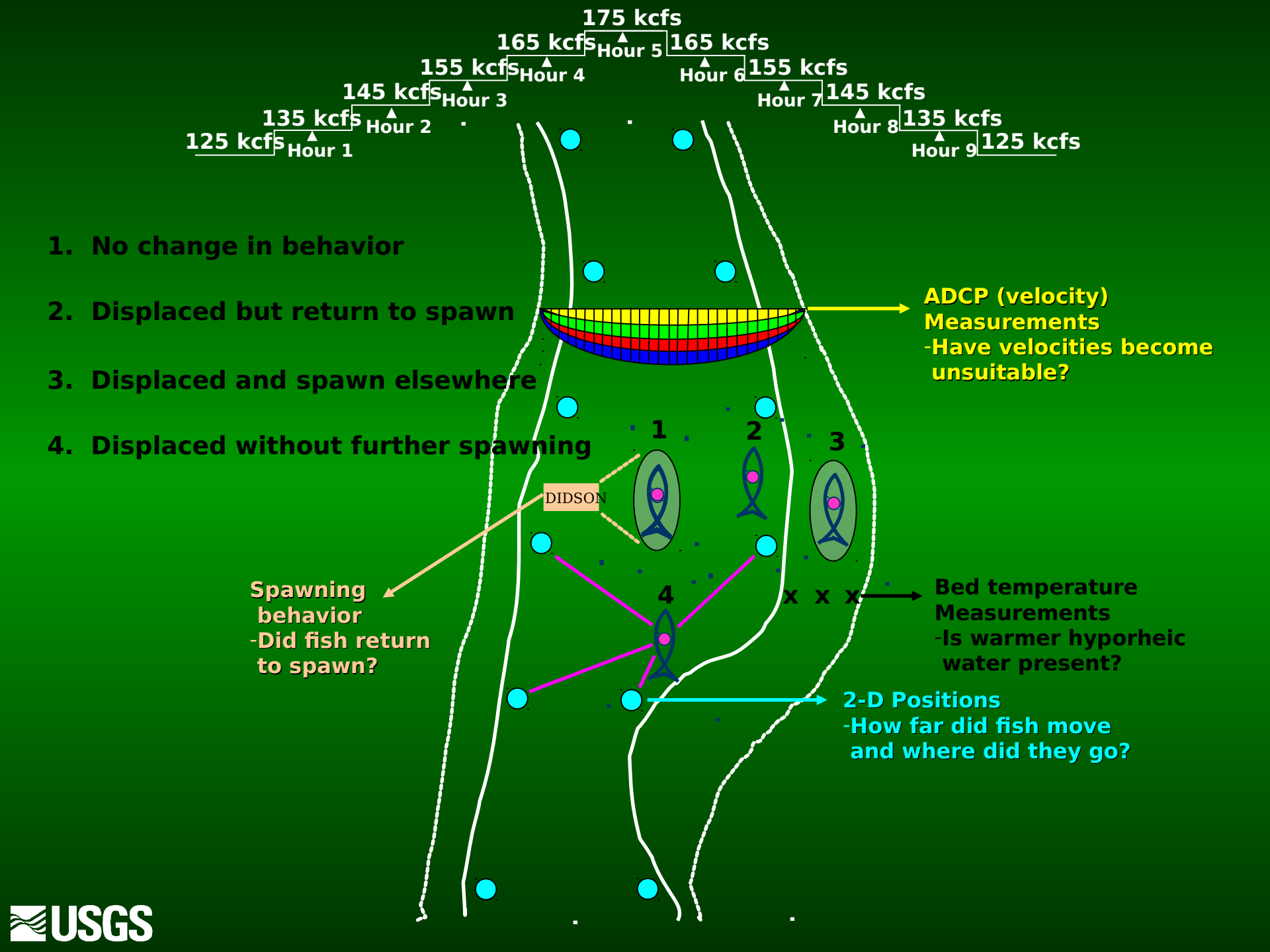
175 kcfs
165 kcfs
Hour 5
165 kcfs
155 kcfs
Hour 4
Hour 6
155 kcfs
145 kcfs
Hour 3
Hour 7
145 kcfs
135 kcfs
Hour 2
Hour 8
135 kcfs
125 kcfs
Hour 1
Hour 9
125 kcfs
1. No change in behavior
2. Displaced but return to spawn
3. Displaced and spawn elsewhere
4. Displaced without further spawning
ADCP (velocity) Measurements
-Have velocities become unsuitable?
1
2
3
DIDSON
Spawning behavior
-Did fish return to spawn?
4
x x x
Bed temperature Measurements
-Is warmer hyporheic water present?
2-D Positions
-How far did fish move and where did they go?
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Proposed Experimental Flow Needs

1 daytime and 1 nighttime test each week for 5 weeks from November 10 to December 8 (10 tests total)

Ramp from 125 kcfs to 175 kcfs in hourly 10-k increments over 5 hours then ramp back down 125 kcfs in the same manner

Daytime tests should be on Wednesdays since no other field activities occur on that day

6 fish will be tagged and released each week

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Expected Products

Determination of whether fish will start constru
a redd at higher elevations during the day or ni

Determination of whether hyporheic conditions
become established at higher elevations during
of elevated flows

Determination of affect of high flows on spawni
success

Identification of the flow, tailwater, and velocity
change chum spawning behavior

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